

AMENDMENTS TO THE SPECIFICATION:

Please replace paragraph [003] with the following amended paragraph:

[003] Previously, municipal water transfer and treatment facilities provided the only mechanism for diverting contaminated water away from natural bodies of water, either for holding or treatment for subsequent transfer to natural settings. In general, that process involved, and continues to involve, the establishment of a system of drains, such as in a parking lot or at a street curb, by which water enters a system of pipe conduits. Eventually, the water received from the drains reaches either a final outlet destination or is directed to a treatment system for contaminant removal. For purposes of the description of the present invention, “contaminated water” is to be understood to mean any water including floating particulate, such as Styrofoam™ containers and oil, for example; non-floating particulate, such as sand and silt, for example; and entrained contaminants, such as ~~fertilizer~~ dissolved nutrients or metals, for example.

Please replace paragraph [008] with the following amended paragraph:

[008] Therefore, what is needed is a separation system that may or may not be part of a larger fluid handling system that ~~is effective in accommodating~~ effectively accommodates varied fluid flow rates. What is also needed is such a separation system that conforms or substantially conforms with established floating and non-floating particulate removal requirements. Further, what is needed is such a separation system that is configured to minimize clogging possibilities and to maximize particulate removal capability in a cost effective arrangement. Yet further, what is needed is such a separation system that is configured for ease of maintenance and to maximize the ability to accumulate particulates.

Please replace paragraph [010] with the following amended paragraph:

[010] These and other objectives are achieved with the present invention. The invention is a fluid separation system having an inlet and an outlet. The inlet may be in direct contact with a fluid or it may be connectable to an upstream fluid transfer conduit. The outlet may be in direct contact with a surface water location or it may be connectable to a downstream fluid transfer conduit. If applicable, the upstream fluid transfer conduit and the downstream fluid transfer conduit may be part of a common municipal water handling system. For example, the upstream conduit may be associated with a drain arranged for water on a surface, such as a

parking lot surface, to be removed from the surface, and the downstream conduit may form part of the water transfer mechanism designed to divert that water from the drain to a municipal treatment plant or natural surface waters. The intake system of the present invention is designed to remove floating and non-floating particulates from the drain water before it reaches the ~~treatment plant~~ final outlet destination.

Please replace paragraph [012] with the following amended paragraph:

[012] In another aspect of the invention, a system is provided for separating floating and non-floating particulate from a fluid and includes a tank having a tank bottom and a storage chamber bottom spaced above the tank bottom, and interior sidewalls, the interior ~~side walls~~ sidewalls and the storage chamber bottom defining a storage chamber, an inlet at a first location on the interior sidewalls for receiving the fluid from an upstream conduit, and an outlet at a second location that may be separate from or substantially near or at the first location associated with the inlet on the interior sidewalls for transferring the fluid to a downstream conduit; a baffle having a bottom attached to the storage chamber bottom, a first side baffle wall, a second side baffle wall and a port through from the first side baffle wall to the second side baffle wall, the baffle connected to the interior sidewalls of the tank; a standpipe substantially centered within the storage chamber and establishing a passageway between the storage chamber and the outlet chamber, the outlet chamber for receiving water from the storage chamber and in communication with a region between the second side baffle wall and a portion of the interior sidewalls of the tank; a bypass including an inlet flow control zone on the second side baffle wall between the inlet and the port of the baffle and an outlet flow control zone on the second side baffle wall between the outlet chamber and the outlet; and a weir positioned between the inlet flow control zone and the outlet flow control zone, the weir configured to divert fluid from the inlet to the baffle port under relatively low fluid flows and to divert one portion of the fluid from the inlet to the baffle port and to allow the remaining portion of the fluid from the inlet to the outlet under relatively high fluid flows.

Please replace paragraph [027] with the following amended paragraph:

[027] The baffle 14 is located within the tank 11 as a sectional wall removably attachable to an interior side 20 of the sidewalls 18. The baffle 14 extends downward from a top

area 21 of the tank 11 to a point above the tank bottom 17. An inner ~~side-wall~~ sidewall 22 of the baffle 14 is configured to prevent floating particulate from exiting the storage chamber 16 of the tank 11. If a lid such as lid 19 is employed, positioning the baffle 14 to be in sealing contact with the lid 19 ensures that non-floating particulate entering the storage chamber 16 cannot move over the top of the baffle 14 and into the bypass 15. Alternatively, a tank 11 with sidewalls 18 and baffle 14 above the highest possible water surface ensures that floating particulates cannot exceed the height of the baffle 14. An outer ~~side-wall~~ sidewall 23 of the baffle 14 is spaced from the interior side 20 of the tank 11 by the bypass 15.

Please replace paragraph [028] with the following amended paragraph:

[028] In an alternative design of the tank 11 of the present invention shown in FIG. 2B, a partial lid 73 detachably connectable to the baffle 14 and a portion of the sidewalls 18 covers only the area between ~~an~~ the outer ~~side-wall~~ sidewall 23 of the baffle 14 and the interior side 20 of the tank sidewalls 18 to ensure that floating particulates do not enter the bypass 15 from the storage chamber 16. The remainder of the inside of the tank 11 that forms the storage chamber 16 remains open to a conventional neck-down riser 74 terminating in a conventional manhole cover 75 at or near the surface. The manhole cover 75 and the riser 74 provide an alternative means for accessing the storage chamber 16. In addition, a net or screen may be deployed within the storage chamber 16 to aid in the separation of neutrally buoyant particulates from the fluid in the storage chamber ~~16 neutrally-buoyant-particulates~~. That is, particulates that neither float and are blocked by the baffle 14, nor non-floating particulates that fall to the bottom 17 and are retained in the storage chamber 16.

Please replace paragraph [030] with the following amended paragraph:

[030] The bypass 15 shown in FIGS. 3A, 3B, and 4 regulates the flow of fluid into and out of the storage chamber 16. The bypass includes a bypass plate 77. The bypass plate 77 may be substantially horizontally oriented with respect to the centerline of the tank 11, it may be sloped or curved, or it may be stepped in an alternative embodiment to be described herein with respect to FIGS. 9A-9C. A weir 24 is disposed on the bypass 15, dividing the bypass passageway into an inlet flow control zone 25 and an outlet flow control zone 26. The baffle 14 includes a baffle port 27 spaced from the tank inlet 12 by the inlet flow control zone 25. As can

be seen, the baffle port 27 is through and through from the outer ~~side-wall~~ sidewall 23 to the inner ~~side-wall~~ sidewall 22. If a net is employed, it is preferably positioned below the baffle port 27 to capture neutrally buoyant particulates as they enter the storage chamber 16. The baffle port 27 and the inlet flow control zone 25 are configured to direct flow entering the tank 11 at the tank inlet 12 in a manner that generates a fluid flow tangential to the inner ~~side-wall~~ sidewall 22 of the baffle and the interior side 20 of the sidewalls 18 of the tank 11.

Please replace paragraph [031] with the following amended paragraph:

[031] The outlet flow control zone 26 of the bypass 15 includes one or more ports 29 through which the fluid exits the storage chamber 16 by way of the intermediate region below the bypass plate 77 and between the outer ~~side-wall~~ sidewall 23 of the baffle 14 and the interior side 20 of the tank 11. Although FIGS. 3A, 3B, and 4 show four of the ports 29, it is to be understood that more or fewer ports may be employed. Further, while the ports 29 are shown as being substantially round, it is to be understood that they may be other shapes including, but not limited to polygons and ovals. Yet further, the dimensions of the ports 29 (or simply one port if that is the design choice) may be selected as a function of the desired fluid output rate from the storage chamber 16 and the degree to which turbulence must be minimized.

Please replace paragraph [033] with the following amended paragraph:

[033] With continuing reference to FIG. 3B, the first curvature aspect 78 is preferably configured to aid in the fluid flow transitioning as the fluid moves within the storage chamber 16 and may have a less severe curvature than that of second curvature aspect 79. The second curvature aspect 79 deviates from the configuration of the first curvature aspect 78 at a weir-baffle interface 80 and terminates at a baffle-chamber interface 81 in a transitional manner so that fluid flow remains as smoothed as possible when the baffle-chamber interface 81 is reached. The arrangement of the curved internally positioned baffle 14, the baffle port 27, and the inlet flow control zone 25 provides a cost effective means for handling substantial fluid flows while also causing removal of floating and non-floating particulate from the fluid. It is configured to balance the twin goals of fluid flow smoothing (i.e., low turbulence) and maximizing treatment volume within the dimensions of the ~~tank~~ tank 11. That is, an optimal curvature of the baffle 14 and of the weir 24 produces the least amount of turbulence within the tank 11 while minimizing

the reduction of the volume of the storage chamber 16 and fluid dwell time therein. In a comparison of the designs of the baffle 14 and weir 24 shown in FIGS. 3A and 3B, it is to be noted that the arrangement of FIG. 3A provides more fluid turbulence in a larger treatment volume while the arrangement of FIG. 3B provides less fluid turbulence within a smaller treatment volume. Both have their advantages.

Please replace paragraph [035] with the following amended paragraph:

[035] The shape and dimensions of the baffle port 27 may be varied or selected as a function of the particular flow conditions to be expected. However, as shown in FIGS. 5A and 5B, the baffle port 27 is preferably shaped to be spaced above the bypass plate 77 near the inlet 12 and to gradually approach the bypass plate 77 away from the inlet 12 toward the baffle-weir interface 80. As a result, under low fluid flow conditions, the fluid is restricted from immediately entering the storage chamber 16 through the baffle port 27 as it passes between the outer ~~side-wall~~ sidewall 23 of the baffle 14 and the weir 24 until reaching the inner ~~side-wall~~ sidewall 22 of the baffle 14 approaching the weir-baffle interface 80. In that way, the fluid is forced to enter the storage chamber 16 tangentially at a higher velocity. If the baffle port 27 were of constant dimension through the inlet flow control zone 25, at low flows, the fluid would immediately spill into the storage chamber 16 non-tangentially at a lower velocity, which disrupts the smooth flow pattern associated with tangential entry. It is advantageous to increase the velocity of low flows to promote the development of rotational flow in the storage chamber 16. As flow rates increase, the fluid enters the storage chamber 16 through the baffle port 27 relatively closer to the inlet 12. The relatively higher fluid velocity associated with relatively higher flow rates aids in maintaining a substantially tangential flow pattern as the fluid enters the storage chamber 16. The relatively high flow rates do not need to be accelerated. The transitional design of the baffle port 27 aids in slowing the flow rate in that situation and therefore aids in reducing turbulence. A baffle port 27 of constant dimensions would be less effective in regulating fluid flow under all flow conditions.

Please replace paragraph [036] with the following amended paragraph:

[036] The bypass 15 comprising the inlet flow control zone 25, the outlet flow control zone 26, and the weir 24 may be formed with a plate connected perpendicularly or substantially

perpendicularly to the bypass plate 77 between the outer ~~side-wall~~ sidewall 23 of the baffle 14 and the interior side 20 of the tank 11. The dimensions of the two flow control zones may be configured as a function of the fluid flow rates required to be treated and defined by the size of the weir 24 and the arrangement of the baffle 14, the bypass plate 77, and any lid, with respect to the interior dimensions of the tank 11.

Please replace paragraph [037] with the following amended paragraph:

[037] The inlet flow control zone 25 is further configured to change the shape of the fluid flowing into the inlet 12 so as to reduce its turbulence when entering the tank 11 and thereby preferably reduce particulate entrainment in the fluid. The tangential flow of the fluid into the storage chamber 16 causes it to pass along the inner ~~side-wall~~ sidewall 22 of the baffle 14 and the interior side 20 of the tank 11 to produce a swirling effect. In the embodiment of the tank 11 shown in FIG. 5B, the bottom of the baffle 14 may be shaped downwardly sloping with respect to the direction of fluid swirl within the storage chamber 16. That shape of the bottom of the baffle 14 is preferably configured to substantially match the shape of the flow of particulates trajectory as they pitch about within the storage chamber 16 so that such particulates may not otherwise be drawn into the area under the baffle 14 before having a chance to settle on the tank bottom 17.

Please replace paragraph [038] with the following amended paragraph:

[038] Referring to FIG. 4, the weir 24 provides a means for regulating the direction of fluid flow through the bypass 15 as a function of incoming fluid flow rate. Weir 24 is designed with a wall height such that its top is substantially equal to or exceeds the height of the baffle port 27. As a result, fluid entering the inlet flow control zone 25 crests the weir 24 at a higher elevation than the top of baffle port 27. The baffle port 27 is therefore preferably submerged when the fluid in the inlet flow control zone 25 reaches the crest of the weir 24. The purpose is to trap floating particulate in the storage chamber 16 during relatively high fluid flow rates while enabling fluid bypassing at such rates, and to allow the weir 24 to trap floating particulates as the fluid surface elevation falls below the crest of the weir 24. During relatively low flow conditions and at the start of relatively high flow conditions, any floating particulate in the inlet flow control zone 25 is washed into the storage chamber 16 such that none is lost over the weir 24 if/when the

fluid reaches the crest of the weir 24. Otherwise, in general, the weir 24 is sized to divert all fluid entering at relatively low flow rates from the inlet flow control zone 25 into the storage chamber 16 in a manner consistent with the desire to create a flow tangential to the interior side 20 of the tank 11, and to maximize removal efficiency while minimizing scouring. The weir 24 is further sized for relatively high flow rates to divert a portion of the entering fluid into the storage chamber 16 and to allow the remainder of the entering fluid to flow directly from the inlet flow control zone 25 directly to the outlet flow control zone 26 for exiting the outlet 13 of the tank. The specific dimensions of the weir may be varied as a function of the desired amount of fluid treatment for particular inlet flow conditions. As earlier indicated with respect to FIGS. 3A and 3B, the weir 24 may be an angled rectangular plate or some other form of polygon or another shape, or it may be curved with respect to the direction of flow of the incoming fluid.

Please replace paragraph [039] with the following amended paragraph:

[039] In operation, fluid entering the tank 11 via the inlet 12 under low flow conditions first passes along the inlet flow control zone 25 of the bypass 15 and is diverted by the weir 24 through the baffle port 27 into the storage chamber 16. As the fluid level in the storage chamber 16 rises, it comes up along the outer ~~side wall~~ sidewall 23 of the baffle 14 until it reaches the underside of the bypass 15. Upon reaching the underside of the bypass 15, it passes through the port(s) 29 of the outlet flow control zone 26. It is to be understood that after an initial filling of the storage chamber 16 as indicated above, the fluid remains substantially at a level of the bypass plate 77. Thereafter, the fluid level in the storage chamber 16 only rises as fluid enters the tank 11. The outlet flow control zone 26 and its ports 29 limit fluid flow through the storage chamber 16 and to increase head loss such that the upstream fluid surface elevation in the inlet flow control zone 25 rises and increases the head and volume of fluid in the storage chamber. This serves to decrease the average velocity of the fluid in the tank 11, a feature that improves flow smoothing previously described. The arrangement of the outlet flow control zone 26 and its ports 29 also causes the inlet 12 to become submerged at relatively lower flow rates, also a feature of value in smoothing flow within the storage chamber 16. That is, at a given flow rate, the fluid within the storage chamber 16 appears much “calmer” when the inlet 12 is submerged.

Please replace paragraph [040] with the following amended paragraph:

[040] As the fluid exits zone 26 by way of outlet 13, non-floating particulates remain in the storage chamber 16 and are generally directed toward the center of the storage chamber 16 due to the tangential flow of the fluid and the reduction in flow turbulence caused by the configuration of the inlet flow control zone 25, the weir 24, and the baffle 14. Floating particulates also remain in the storage chamber 16 and are blocked from reaching the outlet flow control zone 26 of the bypass 15 by the inner ~~side-wall~~ sidewall 22 of the baffle 14 and by weir 24. Under relatively higher flow rates, a portion of the fluid entering the tank 11 continues to be diverted by the weir 24 into the storage chamber 16. The remainder stays in the bypass 15 and flows over the weir 24, traveling directly from the inlet flow control zone 25 to the outlet flow control zone 26. It then flows out of the outlet 13 without having spent any dwell time in the storage chamber 16 for the purpose of removing particulates. That arrangement reduces scouring/wash out effects during said relatively higher flow rates. Also, since most non-floating particulate typically resides at the bottom of a conduit such as a conduit connected to pipe stub 50 due to the effects of gravity and settling, and generally in the lowest region of a fluid flow, the non-floating particulate stratification (most particulates at the bottom of the flow and least particulates at the top of the flow), diverting all of the fluid at the relatively lower flow rate directs most of the non-floating particulates into the storage chamber 16 for removal. On the other hand, the top portion of a fluid flow at relatively higher flow rates contains the least amount of non-floating particulates. The arrangement of the weir 24 allows that top portion (and least particulate containing) part of the fluid to flow directly to the outlet flow control zone 26 under relatively higher flow rates, thereby maximizing particulate separation in an effective separation tank design while also ensuring all fluid flow conditions can be handled.

Please replace paragraph [043] with the following amended paragraph:

[043] In use, the system 10' of FIG. 7 operates in much the same manner as the system 10 shown in FIGS. 1-5, including the bypass arrangement of FIGS. 6A-6C with respect to the intake of fluid, the flow control zones of the bypass including the weir, and the output of fluid having particulates removed. However, it varies from system 10 in the manner of transfer of fluid out of the storage chamber 34 as compared to fluid transfer out of storage chamber 16. In particular, when the fluid level in the storage chamber 34 exceeds the height of the standpipe 33,



it flows down into the output chamber 39 before passing upward along the outer ~~side-wall~~ sidewall of the baffle 31 to the outlet flow control zone (not shown) for transfer out of the tank 30. Preferably, the standpipe 33 is positioned such that the standpipe port 38 is below the fluid surface elevation under all flow conditions, with floating particulates remaining above the standpipe port 38 and non-floating particulates remaining below the standpipe port 38 substantially under all flow conditions so as to avoid scouring of floating and non-floating particulates. More generally, it is to be understood that placing the standpipe 33 substantially centered in the tank 30 such that the fluid exits down through the center of the storage chamber 34 minimizes disruption of the flow pattern within the storage chamber 34 and therefore maximizes particulate separation. Prior devices having conduits extending through the flow pattern disrupt that pattern and are therefore generally less effective at particulate removal.

Please replace paragraph [044] with the following amended paragraph:

[044] As illustrated in FIGS. 8A and 8B, the interior ~~walls~~ side 20 of the sidewalls 18 of the tank 11 may optionally be corrugated. The corrugations 90 are in a helical orientation with the helix spiraling downwardly from the tank inlet 12 to the tank bottom 17. The specific angle of the corrugations 90 may be selected as a function of the desired fluid flow rate down into the storage chamber 16; however, that angle should match the downward flow trend of the fluid under average flow conditions. The corrugations 90 are designed to aid in the smoothing of the fluid flow within the tank 11. In the alternative, the corrugations 90 may be oriented with the helix angle opposing the fluid flow pattern (that is, spiraling downwardly from the tank outlet 13 instead) to produce more turbulence of the flow pattern along the interior ~~walls~~ side 20 of the sidewalls 18 if that is determined to be of interest. It is also to be noted that additional or alternative flow-disrupting projections, such as ribs, may form part of the interior of the tank 11.